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# Galveston County Disaster Preparedness

The lack of disaster  
preparedness is becoming a  
disaster!

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## Abstract

As a nation, Americans are underprepared for disasters. Part of this problem stems from our inability to define the threats we face and from our inability to fully and properly define preparedness. In this paper, I propose a plan to assess a region's threat-level and preparedness-level. Once a professional obtains these values, they can compare them to assess the region's needs and to help in spending allocations. To assist in explanation, two cities' disaster threats are analyzed to point out weaknesses that the general public may not understand. Galveston, Texas is one of these cities and is also where I completed my field experience. During this time, I learned about Galveston County's disaster plans, specifically those for hurricane recovery and Points of Dispensing during the recovery process.

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Thank you all.

## Dedication

To the survivors, both 2-legged and 4-legged.



*Figure 1: Sean Xuereb recovers a dog from the rubble of a home destroyed by a tornado on May 21, 2013 in Moore, Oklahoma  
Photo by: Scott Olson, Getty Images (Grossman, 2013)*



## Preface

On a sunny, warm July afternoon on Bolivar Peninsula in southeast Texas, during my daily walk on the beach, I note the cooler than usual water. I discuss this with a local and they inform me of the benefit: the cooler water keeps away tropical storms. Such storms remain fresh in the minds of those in the area; hurricane Ike roared ashore in September of 2008. The storm surge slowly rose from both sides of the peninsula, gradually engulfing beaches, bait shops, restaurants, and eventually almost the entire peninsula and wiping away most of the houses. Ike left behind an in-ground debris field and an off-shore debris field of homes and other wreckage. The storm surge topped out at 15 feet (2008 Atlantic hurricane season, 2013), above most building code minimum heights at that time. Those homes not as badly affected by the water still faced boats, cars, debris, and even other buildings washing through their pylons.



*Figure 2: Aerial view of damage after Hurricane Ike on Bolivar Peninsula, Texas on September 22, 2008 (Augustino, 2009)*



## Introduction

With hurricanes, the constant threat of bioterrorism and also the region-specific hazard of refinery explosion, Texas' Gulf Coast region needs many different disaster preparedness plans. Due to their long history of hurricanes and other disasters, the Galveston area survivors have recovery operations and methods down to a science, making it a good area to study. I traveled to the Galveston region to complete an internship at the Galveston County Health District working with their Public Health Preparedness specialists and Epidemiologists to gain a better understanding of what goes into hurricane and general disaster preparedness planning. I spent the majority of my time with the public health preparedness professionals getting their Medical Reserve Corps organized, trained, and helping with a large volunteer recruitment drive. I arrived at the end of May, just in time to help with the beginning of hurricane season, community education, and preparedness. While hurricane preparedness remains first and foremost in Texans' minds, they plan for almost all possible scenarios. "Public health readiness and response activities can be conceptualized similarly for intentional attacks, natural disasters, and human-caused attacks" (Barnett, 2005, p. 561). Even the federal government recognized this need and instead of constructing many detailed plans adopted the "all-hazards response model as its fundamental paradigm" (Barnett, 2005, p. 561). This improves efficacy and efficiency by reducing the need to form a family of disaster plans for every possible scenario.

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*Emergency preparedness refers to the capability of individuals, as well as public health and risk organizations and communities to prevent, protect against, quickly respond to, and recover from emergencies. The term "emergency" connotes the sense of a sudden and unexpected onset of a disaster, but it also can be applied to other situations, which may not reach the level of a "disaster." From a public health perspective, emergencies tend to be characterized by disruptions in essential services, such as utilities, transportation, and food supply; the potential damage or destruction of dwellings and businesses; and the need for evacuation or rescue. (Paek, 2010, p. 429)*

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## Objectives

- To learn about day-to-day activities in a health department/district
- To observe and learn about public health emergency preparedness planning
- To assist in emergency preparedness volunteer exercises and planning
- To help the Galveston County Health District prepare to respond in case of a public health emergency
- To learn about the plans in place in case of a hurricane or other disaster along Texas' Gulf Coast

## CHAPTER 1: Threats vs. Preparedness

Here in the United States, we lack overall preparedness for emergencies (Paek, 2010). This includes terrorism, natural disasters, or man-made accidents. Extensively discussed by journal articles and books, experts question the concept of preparedness. Many can spout off a dictionary definition about readiness for any situation that arises and some may even mention the necessity of having multiple plans or one encompassing plan. Either way, this narrow focus solely on preparedness falls short.

### Threat-Level and Preparedness-Level Analysis

In order to make a comprehensive preparedness plan, planners need to take their threats into account. They need know their vulnerability to disasters, both man-made and naturally caused. This section explores the idea of nation-wide threat-level analysis and preparedness-level analysis. This would allow planners to know, based on a standardized assessment, where they should concentrate their efforts. Such a plan would not only benefit those constructing the plans, but also the government and others in seeking funding by showing constituents where they are falling short. Finally, this would benefit the general public because they would be more aware of threats in their area and actions being taken to protect them in a much easier and straight-forward manner.

Public health professionals and other disaster planners need to know their vulnerabilities to disasters in order to properly build preparedness plans. Dr. Irwin Redlener, Director of the National Center for Disaster Preparedness at Columbia University's Mailman School of Public Health, states it best in his book *Americans at Risk: Why We Are Not Prepared for Megadisasters and What we Can do Now* when he writes, "a better state of readiness for major disasters will mean having the courage to accept the threats that are real and the discipline to design and implement strategies that could actually make a difference" (pg. XXV). To assist professionals in accepting these threats, I propose a threat level assessment scale. This program would analyze each disaster or threat for the region and dissect it into multiple indices, each given a different weight. The analysis and weights would get assigned numbers based on professional evaluation and research. In the end, the disaster planners will have numerical assessments of the threat-level for their region. Interested parties can then compare this value to a similar value for the regional disaster preparedness assessment to

determine the balance between threat-level and preparedness-level. This will help with what Redlener defines as the purpose of disaster planning: “to find that ‘sweet spot’ where we set goals reflecting a *prudent level of readiness* that neither drains the treasury, nor fosters an obsession with disaster risk” (pg. 103).

#### Threat-level analysis

For each disaster or other threat to a region, professionals need to assess many factors, including but not limited to: how many people affected (including assessing demographics), how many businesses affected, how many homes affected, hospitals and medical facilities affected and/or needed, amount of equipment lost, infrastructure upset, financial cost to rebuild, financial loss while out of commission, livelihood upset, other areas in the region needed to support or shelter evacuees, lives lost, and emotional toll. The figures to construct the proposed scale for each factor, including the weighing index need determination by experts in each respective field. That is beyond the breadth of this proposal. The value from this assessment can then be weighed against the value from the preparedness assessment to determine the balance between preparedness and vulnerability. Even areas not directly affected by the event should still consider the effects of having large numbers of evacuees. This falls not only into a threat to those areas but also a factor they must take into consideration during preparedness.

#### Preparedness-level analysis

Once again, this analysis should be run for each disaster or threat to a region but this analysis also includes three sections: before, during, and after the event. In assessing preparedness *before* the event, professionals will look at prevention, prediction, and preparedness for the event. This includes addressing such issues as: Can the event be prevented? Can it be predicted, and if so, with how much notice? Can it be avoided/ can individuals evacuate? Are appropriate buildings/ sensors? How much public awareness is in place (including awareness of the threat and any plans)? How much is the public educated/ aware? Are emergency facilities in the area prepared? In assessing the preparedness for *during* an emergency event, the assessment should include dissecting evacuation plans (especially evacuation of medical facilities), the possibility of sheltering in place, and the need for monitoring the disaster as it unfolds (e.g. weather stations, etc). Finally, in the *aftermath*,

preparedness assessments look at plans such as Points of Dispensing, recovery efforts, search and rescue, patrols for those returning or to keep residents from returning, security to prevent looting, insurance necessary in the region, body disposal, medical care, rebuilding the infrastructure, and many other region-specific or disaster-specific needs.

Even with this extensive analysis, planners cannot think of every scenario or anticipate every aspect of a disaster—they need flexibility and to learn from past experiences.

### Sample Analyses

One cannot fully understand the meaning of preparedness until they completely appreciate their vulnerabilities. For an example, the next section compares and contrasts two very different cities: Manhattan, Kansas and Galveston, Texas. These act as examples of very different climates and settings with one lying in the Midwest and the other along the coastline.

Statistics from Wikipedia	Galveston, Texas	Manhattan, Kansas
Area (total square miles)	208.3	18.79
Area covered by water (mi <sup>2</sup> )	162.2 (77.85%)	0.03
Area land (mi <sup>2</sup> )	46.1	18.76
Population (2012 statistics)	47,762	56,069
“Current” conditions via weather.com at 2:00pm on 10/2/2013	Partly cloudy	Fair
Temperature	85°/ feels like 95°	81°/ feels like 83°
Wind	SSE at 9mph	S at 11 mph
Humidity	79%	66%

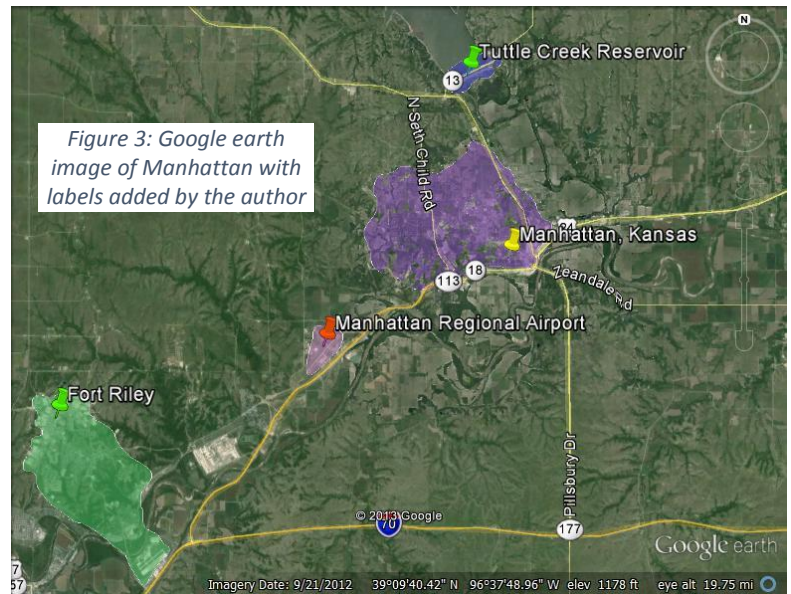
*Table 1: Galveston and Manhattan statistics from Wikipedia and weather.com*

### Manhattan, Kansas

On first impression, Manhattan may not come across as having much to worry about. Near the center of the country, this small city lies nestled between the Kansas River and the Big Blue River in north eastern Kansas. Home to Kansas State University (KSU), this college-town sits on the majestic Konza Prairie, among the rolling Flint Hills. Home to Sunset Zoo, a modest zoo that houses bears, tigers and multiple species of primates, Manhattan also has a regional airport and the Biosecurity Research Institute (BRI). A biocontainment level 3 lab, by the year 2020, the BRI will also host the National Bio and Agro-defense Facility (NBAF). Manhattan neighbors Fort Riley, the home of the Big Red One first infantry division. Militarily speaking, the

Whiteman Air force Base lies just a few hours' drive away in central Missouri. Overall, this sleepy little college town in the middle of the country has a deep, dark secret.

Manhattanites ignorantly live in danger. In the middle of the tornado belt, most Kansans including those in Manhattan understand the risks of tornados. The real danger, however, lies just below the surface. The Nemaha Ridge, a long structure bounded by several faults, runs near Manhattan. The Humboldt Fault Zone poses a particular risk to the Little Apple. In 1867, an earthquake measuring 5.1 on the Richter scale (explained in Appendix B) shook Manhattan (Wikipedia, 2013). The earthquake caused no fatalities, just injuries and relatively minor architectural damage. The Humboldt Fault Zone lies a mere 12 miles east of the Tuttle Creek Reservoir near Manhattan. If an earthquake destroyed the Tuttle Creek Dam, this would release 300,000 feet of water per second, flooding the nearby area. In addition to tornadoes and earthquakes, Manhattan also faces the risk of flooding even without the dam breaking; it lies in the flood plain between the Kansas and Big Blue rivers. Due to its location in the Great Plains, Manhattan experiences an extreme range in temperatures. With the possibility of up to a foot of snow accumulation over the winter and temperatures reaching the century mark during the summer, extreme weather poses a year-round threat. Other hazards facing



Manhattan residents come from man-made dangers instead of natural disasters. First, from within her own borders, Manhattan faces risks posed by having an airport, those from wild animals in the zoo, and possible pathogen release from the BRI and future NBAF (either intentional or accidental). The risk from the airport comes from having increased accessibility



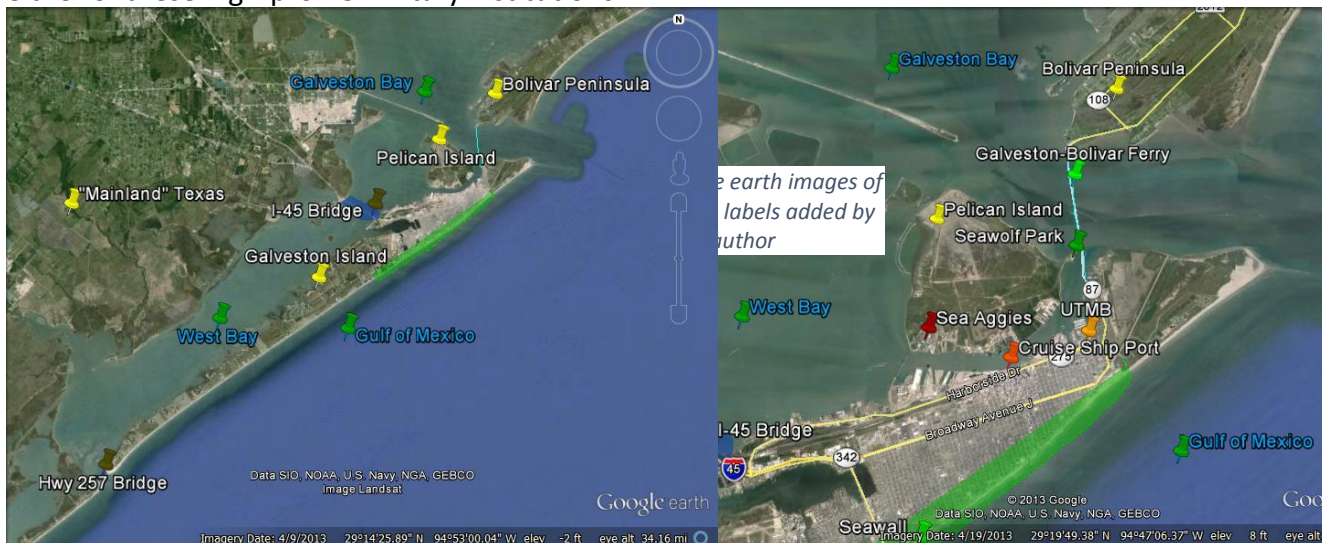


Figure 4: Current BRI and future NBAF sites  
[http://en.wikipedia.org/wiki/Manhattan,\\_Kansas](http://en.wikipedia.org/wiki/Manhattan,_Kansas)

and speed of travel to the small town, allowing for a possible disease outbreak to enter via air transport and threat of terrorism. While over-sensationalized in current movies, disease entry and transport via airlines truly threatens Americans every day. Additionally, Kansans may chuckle at the mention of “lions and tigers and bears” but “oh my!” would these become a problem if something

happened, such as a tornado, to damage the zoo’s animal enclosures. Finally, the BRI houses up to Biosafety Level 3 (BSL 3) pathogens, possibly including rabies virus, *Yersenia pestis* (the bacterium which causes the Black Plague), West Nile Virus, SARS coronavirus, and many more commonly known diseases which cause severe symptoms to fatality, but for which treatments exist. In the case of the NBAF, the possibility includes up to BSL 4 pathogens for which no cure exists or which experts consider extremely dangerous, regardless of the cure, including Ebola and Smallpox. Release of such a pathogen could have deadly pandemic consequences.

The final threat Manhattan faces comes veiled in the security of having military forces less than 20 miles from the city limits making the area a target. Whiteman Air Force Base, home of the B-2 stealth bombers, stands less than 200 miles away. Their location in the middle of the country provides these facilities a degree of security, but does not make them invincible. While unlikely, Manhattan disaster planners must take into account the possibility of attack upon either of these high-profile military institutions.



## Galveston, Texas

The small vacation destination of Galveston, Texas stretches along the barrier island of Galveston Island and Pelican Island in the Gulf Coast, 50 miles southeast of Houston. Accessible by the Galveston-Bolivar Ferry from the Bolivar Peninsula on the northeast side, the island also has two other highway access points. Many tourists enjoy riding the ferry and feeding the seagulls while all riders, even daily commuters, enjoy the gulf sea breeze and watching for playful porpoises popping from the water. The ferry ride crosses the entry to the Houston ship channel and riders often see large freighters and tankers passing through, in addition to sailboats and commercial fishing boats. Tourism plays a large role in the economy for this city, along with healthcare and shipping. Tourism draws individuals to the six historic districts in the city, including the Strand shopping area and Moody Mansion. The University of Texas Medical Branch (UTMB) located on the island hosts 2,500 students and these become a large part of the economy. Additionally, Texas A&M University has a branch on Pelican Island where the “Sea Aggies” attend classes. The smaller island also houses a memorial to USS Seawolf, Seawolf Park, which houses three different preserved U.S. Navy Ships (Wikipedia, 2013). Another tourist draw to the city cruises in and out almost weekly: the Port of Galveston offers safe landing for cruise ships (Port of Galveston, n.d.). Galveston currently holds the title of #1 cruise port on the Gulf Coast (Wikipedia, 2013). Beaches, restaurants and shops attract individuals from across the country to enjoy this barrier island, creating a draw to the city.

While the rich history of Galveston Island attracts tourists, it also shines a light on some of the dangers of island living. The biggest historical disaster to the island struck on September 8, 1900: the Hurricane of 1900. The Galveston Hurricane remains the deadliest natural disaster to ever strike the United States with a death toll between 6,000 and 12,000—to put this number in perspective, consider the deadliest storm of recent times, Hurricane Katrina which claimed 1,800 lives (Wikipedia, 2013). At the time the biggest city in the state of Texas, the hurricane decimated the booming town of 37,000 residents. Amazingly, one weather ‘expert’ wrote in a local paper that “it would be impossible for a hurricane of significant strength to strike the island” (Wikipedia, 2013, p. 3). Emboldened by this brazen statement, developers cut-

down sand dunes along the shore to fill low areas in the city, thus removing what little barrier the city had against the Gulf of Mexico. This construction left the highest point in the city at only 8.7 feet above sea level. Then Mother Nature added in a storm surge of 15 feet, the result: 6,000 dead, 30,000 homeless with over 3,600 homes destroyed, and \$20 million in damages (Wikipedia, 2013). The hurricane brought maximum wind speeds estimated at 120 mph and barometric pressures so low, most considered the readings “obviously in error” (Wikipedia, 2013, p. 5) though estimates eventually placed this hurricane as a Category 4 classification on the Saffir-Simpson Hurricane Scale.

Category	Sustained Winds	Types of Damage due to Hurricane Winds
1	74-95 mph	Very dangerous winds will produce some damage
2	96-110 mph	Extremely dangerous winds will cause extensive damage
3	111-129 mph	Devastating damage will occur
4	130-156 mph	Catastrophic damage will occur
5	157 + mph	Catastrophic damage will occur

*Table 2: Saffir-Simpson Hurricane Wind Scale (NOAA/ National Weather Service, 2013)*

Another hurricane, this one in more recent history, hit Galveston Island; Hurricane Ike swept across the beaches on September 13, 2008 as a Category 2 storm with winds of 110 mph. These hurricane force winds extended 120 miles from the center (at one point, the storm stretched over 600 miles) and experts predicted the storm to make land-fall with wind speeds of a Category 2 storm, but with a storm surge of a Category 4 storm. In the



*Figure 6: Hurricane Ike just before making landfall*

[http://en.wikipedia.org/wiki/Hurricane\\_ike](http://en.wikipedia.org/wiki/Hurricane_ike)

aftermath of this storm (which eventually traveled all the way to Iceland), the region lost over 8,000 housing units, 3,459 families became homeless, and UTMB sustained significant damage (Wikipedia, 2013).

While all disasters have far-reaching consequences, not all natural events affecting Galveston fall into the category of disasters. The region has many tectonic faults, and several of these active, but none produced significant earthquakes in recorded history (Wikipedia, 2013). Experts believe fault creep in the area keeps the tectonic plates in constant but seismically

negligible movement, thus reducing the risk of earthquakes. Not including hurricanes, the biggest risk to Galveston residents comes from local industries.

Located in southeast Texas, Galveston residents live in one of the country's highest oil producing areas. This includes on and off-shore drilling and many refineries on the mainland. The area faces dangers from industrial accidents, manufacturing explosions, and ship channel accidents. As with any city containing highways and railways, transportation accidents or spills also pose a threat. Additionally, Galveston Bay receives toxic chemicals from industrial discharge and pollutants washing in from the Houston Ship channel as well as storm run-off from commercial, agricultural and residential sources (Wikipedia, 2013). An example of both shipping and manufacturing accident occurred in 1947 when a ship carrying ammonium nitrate detonated in Texas City. The April 16<sup>th</sup> explosion forced Galvestonians 10 miles away to their knees and in the aftermath, an oily fog drifted over the island, eventually leaving deposits over every exposed outdoor surface (Wikipedia, 2013). More recently, another industrial accident rocked Texas City, this time in 2005 when the BP Texas City refinery experienced a hydrocarbon vapor cloud explosion. While this did not directly affect the island, many residents commute to the mainland and work either in Texas City or Houston, having to drive through Texas City. An even more recent example of a man-made accident occurred earlier in 2013 in West, Texas when a fertilizer plant exploded on April 7<sup>th</sup>. All of these incidents further enforce the dangers facing the Galveston area. The final threat comes from terrorism: since Galveston Bay opens into the Houston Bay and acts as one of the main thoroughfares for large ships, it poses as a prime target for interrupting commercial shipping. Additionally, UTMB contains a BSL 4 lab and thus invites the same possibilities for pathogen release and terrorism targeting as previously mentioned for Manhattan.

These two towns have many different risks and those making plans for disasters need to recognize these. While it becomes tempting to limit one's efforts and funds to making plans for the disaster of most-recent history, or the current "trend" in terrorism, each area should seriously assess their needs and vulnerabilities. Only once an area fully comprehends their vulnerabilities can they then start to understand and prepare plans.

0	65-85 mph
1	86-110 mph
2	111-135 mph
3	136-165 mph
4	166-200 mph
5	200+ mph

Manhattan, Kansas made changes to address some of their hazards. The largest undertaking in recent history, the reinforcement and strengthening of Tuttle



Figure 7: Dam Failure Warning System (URS Corps, n.d.)

Creek dam took nearly 8 years. The U.S. Army Corps of Engineers installed anchors to solidify the dam (APNewsNow, 2009) as well as hiring an outside company to design, build and maintain a Dam Failure Warning System (DFWS). This includes instruments to detect seismic activity and dam deformation, a video surveillance system, a siren warning system and an evacuation plan (URS Corps, n.d.). To mitigate the risk of tornadoes, those living in tornado alley must plan ahead since they receive little warning of these unstoppable destructive freight trains. On June 11th of 2008, even though a tornado rating 4 on the Enhanced Fujita Scale barreled through Manhattan, leaving a wreckage of 45 residences, two mobile homes and three businesses destroyed and significant damage to an elementary school and KSU, no residents died. This speaks to the resiliency and preparedness of those living in the region: they have plans and know where to go and what to do when the tornado sirens sound.

The BRI, a newer hazard to Manhattan, still has a lot of residents spooked. Standing on the corner of KSU's campus, this BSL-3 lab contains state-of-the-art security not only to limit human entry and exit but also to limit pathogen entry and exit. In the selection of the site for the future NBAF, authorities worried about placing the facility in Kansas due to hazards posed by tornadoes and many share this fear of tornado damage releasing a pathogen from the BRI. While it is possible for tornadoes to level houses, both the NBAF and BRI facilities were built much stronger, sturdier and secure. As for preventing manual release of pathogens, this falls in the same category of dangers from the airport: the city must simply increase security and screening.

Table 3: Enhanced Fujita Scale  
(The Weather Channel, 2012)



Galveston County actually has a very extensive hurricane preparedness plan and the plan's breadth means it can accommodate almost any disaster they may face. Most weather enforcement efforts for Galveston City occurred in response to the devastation of the Hurricane of 1900, including building the seawall and raising the city.

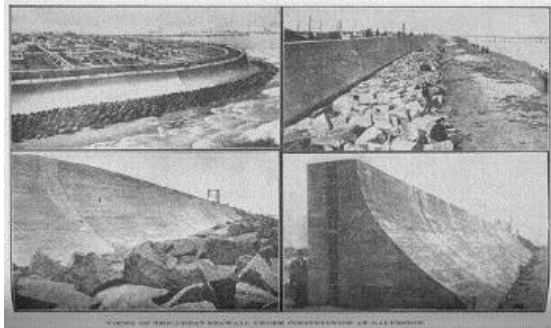


Figure 8: Building the Galveston Seawall, from the 1904 Texas Almanac

The Seawall, a structure that stretches for ten miles along the Gulf side of the island, stands 17 feet tall. The seawall “was built to protect the island from tidal surges and hurricane force winds”

(Galveston.com & Company, Inc., 1994-2012)” and

continues to stand to this day, now for over 100 years. The original portion of the seawall started in 1902 and modifications and additions continued through the years. While the enormous undertaking of building the seawall consisted of “5,200 railway carloads of crushed granite, 1,800 carloads of sand, 1,000 carloads of cement, 1,200 carloads of round wooden pilings, 4,000 carloads of wooden sheet pilings, 3,700 carloads of stone riprap and five carloads of reinforcing steel (Ramos, 1998-1999)” in the original section, it pales in comparison to raising the grade of the city.

In December of 1903, work began on a project to raise the entire city to keep flooding at a minimum. According to the Texas State Historical Association, this project consisted of sectioning off the city into quarter-mile-square sections and enclosing this with a dike and then raising all structures and all utility lines including water, power, telegraph, and streetcar lines. This meant



Figure 9: Lifted St. Patrick's Church (Intagliata, 2013)

that leveler jacks raised over 2000 buildings, including the 3,000 ton St. Patrick's Church, raised five feet by 700 jack screws (Ramos, 1998-1999). Workers reached the desired level by pumping sand dredged from the ocean to the different areas, allowing this to dry, then building foundations on the fill and finally attaching the buildings to their new bases. When completed

in 1910, 500 city blocks sat anywhere from a few inches to over 16 feet from their original footings by the use of 16.3 cubic yards of sand (Ramos, 1998-1999). The elevation change provided a chance to build a gradient into the island that did not exist before, correcting drainage and sewage problems; the area immediately behind the seawall sits at over 16.5 feet, giving the seawall a solid support and the gradient decreases by one foot for every 1,500 feet west to Galveston Bay. The hurricane of 1915 tested all these improvements, especially since experts considered this storm as strong as its predecessor in 1900. Even though waves battered the new seawall, those behind this barrier sustained little damage while the hurricane damaged 90% of the buildings outside the protection of the seawall. Even so, only 8 fatalities resulted due to the improved drainage and city protection provided by the increased elevation.

These examples of disaster mitigation plans for both Manhattan and Galveston highlight vulnerabilities and the need for proper planning. The next section will look more in-depth into the post-disaster recovery plans in place at the Galveston County Health District.

### Galveston County Health District: Organization and Opportunities

The Galveston County Health District (GCHD) collaborates its efforts with other municipalities, making it more than a health department. The main areas of service in the Health District include: Air and Water Pollution; Consumer Health; Epidemiology; Animal Services; Community Outreach; Coastal Health and Wellness Clinic; Galveston Area Ambulance Authority; Immunizations; Public Information; Public Health Emergency Preparedness; Public Health Laboratory; Senior Health; Sexually Transmitted Disease (STD/HIV); Tuberculosis Services; Vital Statistics; and Women, Infants and Children (WIC). While I spent most of my time with the Public Health Emergency Preparedness staff, I also spent time observing function in other areas of the health district. A general purpose clinic whose services include medical and dental care, the Coastal Health and Wellness Clinic offers discounted services available on a sliding income based scale. One of my mentors works in the indigent care program and I found it interesting to see how this process works. I also spent time in Animal Services both at the animal shelter and with the animal control officers observing function and general practices. I spent a lot of time working with the epidemiologists as well. This department investigates diseases and outbreaks and while there, I assisted in investigating a pool Norovirus outbreak



among children. The pool investigation also involved Consumer Health Inspectors who inspect swimming pools as well as food service establishments, private sewage facilities and private water wells.

## CHAPTER 2: Disaster Preparedness

A hot topic among government organizations since the September 11<sup>th</sup> attacks in 2001, disaster preparedness sent companies scrambling to form plans for response in case of terrorist attacks. With busy hurricane seasons like that of 2005 and massive storms like Sandy, coastal response also focuses on natural disasters. Tornadoes like those that struck Oklahoma in May of 2013 keeps those in the heartland of the country on their toes as well.

Even cities not directly affected by the disasters may still need preparedness plans. In 2005, Omaha, Nebraska hosted 166 victims displaced by hurricane Katrina. Of these evacuees, “about 15% ... had acute injuries, including lacerations, fractures, abrasions, and infected insect bites” (Young, 2006, p. 299). One of the evacuees had an untreated snake bite. While Omaha does not plan to deal with hurricane winds, debris, and water, they still responded when needed. The Nebraskans also coordinated medication for the evacuees because about 45% had preexisting illnesses but had gone without their medications for more than 10 days (Young, 2006). The local Medical Reserve Corps (MRC) physicians and pharmacists partnered with Walgreens to procure medications for the evacuees.

### Media

In the case of a disaster with necessary public health intervention, two reasons for public communication exist: first, inform them of the situation so that they may take steps to keep their family safe, and second so that they do not panic. The media have a controversial power and task before them in disasters. Those in public health consider the media as a necessary evil, while journalists consider themselves the “watchdogs” of governmental actions.

Those in the public health profession become torn between their need to educate the general public and their duty to protect the rights of their patients during a very vulnerable time. While photographs and other outlets may “help in organizing a quick response from the rest of the world,” according to Anant Bhan in an essay published about health professionals allowing reporters inside hospitals and clinics at times of natural disasters, “there has been little

consideration to date of the ethics of health-care staff allowing access to media inside medical institutions at times of natural disasters (Bhan, 2005, p. 0417).” This fine-line the physicians must tread ensures that they maintain a balance between making the experience more salient to the public (Paek, 2010) while protecting patients.

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In a recent article published by a reporter about his first-hand experience in the devastation after the Moore, Oklahoma tornadoes, Alex Hannaford states that: “in two days I'd witnessed some fairly questionable behavior by some segments of the media in Moore: tabloid reporters sent solely to have their pictures taken amid the rubble to show their readers they were there; a news crew interviewing children who had lost a teacher, repeatedly asking “How did you feel?” in an attempt, presumably, to elicit tears. It left in bad taste, and I wondered whether this kind of “reporting” can impact those trying to tell the same story both ethically and sensitively. Was it any wonder I got the feeling we'd overstayed our welcome” (Hannaford, 2013)?

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On the other side of the argument, “journalists aim to inform the public about health risks, but they feel obligated to go beyond passive dissemination of information. Journalists may adopt a wary and even skeptical stance regarding government health agencies and spokespersons.”  
(Lowrey & et al, 2007, p. 3).

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Some argue that fault does not fall on the journalists themselves because they do not have sufficient background in medicine and science. This leads to the journalists possibly not fully understanding a position and getting into a situation where “journalists may mistake experts’ typically cautious and hedging language about health-related emergencies as evidence of stonewalling or incompetence, and that journalists too eagerly seek sources—sometimes less reputable sources—who will speak with relatively less caution” (Lowrey & et al, 2007, p. 5). Either way, whether intentional or not, this kind of coverage may cause the general public to become wary of the efforts made by public health officials and may induce more panic. In Hannaford’s account, he gives the example that while in Moore and trying to cover the story, police confined all the journalists to a media area outside a shopping center where police limited their interviewing rights to only first responders. When Hannaford ventured outside this area and found a couple retrieving what memories they could from the rubble that used to be their home who agreed to talk with him and give him an interview this was interrupted by a

police officer. When the journalist asked to spend a few more minutes with his willing interviewees, the officer responded with: “If you don't leave now, I'll arrest you. These people have lost everything and they don't want to speak to you” (Hannaford, 2013).

But where does the solution lie? Should the physicians and other health-care professionals take responsibility for policing journalists, possibly swarming around looking for the next front-page image—or even worse, a headline to gather funds? Should medical facilities completely shut-out journalists during a public health emergency? Can these two reach a truce? Yes! The respite comes in the form of the Public Information Officer (PIO). This individual becomes the go-between for the journalists and the experts, having knowledge about the resources in the facility and knowing the right person to answer a specific question. To help protect patients’ rights, journalists take no pictures and conduct no interviews without going through the PIO first. This allows the health care workers to focus on their lifesaving measures first, and the media second but still allows the message to get out to the public. Finally, journalists, community leaders, health departments, and medical humanitarian agencies such as the Red Cross should meet to form guidelines for ethical reporting of disasters. Bhan goes as far as to suggest that “perhaps only journalists who have been accredited ... should be given access to disaster sites” (p. 0472). In the end, all must focus on the big picture: “media ... have important roles to play in informing the public about disaster risks and about the state of preparedness capabilities” (Irwin Redlener, 2006, p. 101).

During a planning meeting for a disaster full-scale exercise held at GCHD, professionals debated the need to add a PIO into the exercise and practice media communication but in the end pinned this as unnecessary. However, experts in the field argue that involving media even in training allows them to feel involved and establishes more open lines of communication. This also provides an opportunity to practice disaster communication. Finally, the media can inform the public that their local health authorities practice preparedness drills to stay ready.

In the case of Hannaford and other journalists who may want more than just the story from a first responder’s point of view, Hannaford offers one last bit of advice, “despite the feeling in the immediate aftermath of a tragedy that you should get in quickly, tell the story and get out, we need to continue to report stories as long as there are stories to tell” (Hannaford,

2013). He continues with offering that if reporters, survivors and other interviewees tire of telling/ hearing the same old story or simply reliving the tragedy, then it's time for the journalists to come at the story from a different angle.

### Point of Dispensing (POD)

A Point of Dispensing (POD) site sets up to mass-dispense medication to the public in a time of need. These may also dispense medications like ciprofloxacin in the case of a bioterrorism attack like release of *Bacillus anthracis* (anthrax) release in a bioterrorism attack. For a natural disaster such as a hurricane, a POD may provide first-responders and those returning tetanus vaccines. Even in day-to-day public health use, a POD could dispense flu vaccines in case of an epidemic like that seen with H1N1. "Many communities activated their bioterrorism vaccine dissemination plans to distribute flu vaccine in 2005, using relationships among public health agencies, the medical community, and organizations such as the Red Cross" (Katz, Staiti, & McKenzie, 2006, p. 950).

Most PODs receive medications through the Centers for Disease Control and Prevention (CDC) and Homeland Security from the Strategic National Stockpile (SNS). Made of two types of stocks, the SNS contains medical supplies and medications. Ready to send to an area in need within 24 hours of request, "push packages" contain non-specific medications, supplies, and broad-spectrum medications. These help with the initial contact, hopefully containing the beginning illness. Storing the push packs in secure, strategic locations makes them more accessible across the country faster. The second stock of medication, called the Managed Inventory (MI), makes up most of the SNS. Upon confirmation of diagnosis and establishment of need, the CDC releases specific drugs like small pox vaccines.

Once a disaster hits and local authorities establish the need for public medication, volunteers and public health professionals deploy to set up PODs. In the case of deployment by GCHD, the volunteers receive calls, emails, or text messages to get the POD sites prepared and set up with the supplies in the POD boxes. GCHD supplies the POD boxes in a set of four to each site: a trunk with 4 drawers, a stackable POD box, a Refrigerator Box with a 3.3 cubic foot refrigerator and 3 drawers in addition to in-lid storage, and a Large US POD box with the same type of in-lid storage and 3 drawers. Each box has a specific focus so that they have specific stations instead of simply acting as storage centers. The Trunk, packed as the office supplies

station, has drawers packed with pre-loaded staplers (to allow for readiness in deployment), scissors, pens, clipboards, flashlights, and other general office supplies. The Refrigerator Box has an extension cord for the refrigerator which also has a thermometer to ensure that it reaches electricity and stays at a safe temperature for vaccines or medications enclosed. The drawers with the refrigerator contain other first-aid supplies such as gauze sponges, tissues, hand sanitizer, respirators, table drapes, cotton balls, biosharp containers, and extra nitrile gloves. This box works as a medical station, including the in-lid storage of gloves, Band-Aids and hand sanitizer. The Large US POD Box also has similar in-lid storage with Band-Aids, hand sanitizer and alcohol wipes. The drawers hold more medical supplies such as protective glasses, digital oral thermometer with probe covers, more gauze sponges and nitrile gloves, and a first-aid kit. The Stackable US POD Box acts as a storage box for extra supplies like cases of Nitrile gloves and gallon jugs of hand sanitizer. The Stackable Box also works well for storage and transport of large items such as soft-sided coolers, POD signage, traffic directing flashlight wands and a printer. Because of its multipurpose function, the box functions not only as extra storage and large item storage, but also as a general function supplies box for items such as flashlights, radios, caution tape, a bull horn, and rope. Each box also contains a laminated inventory list of the complete box set (attached in Appendix C). When staff need to restock supplies, they will know where to find what they need. Also, the Large US POD Box and the Refrigerator Box fronts remove to access the drawers and then can set-up as tables. However, the POD site provides most tables.

Usually located in high schools or community colleges, the sites selected require public familiarity and good access. GCHD's POD plan sets up in school gymnasiums lending to high community familiarity and accessible parking. The POD site provides facilities such as restrooms as well as having maintenance personnel on site if needed. Appendix D contains an example of a site-specific POD map. In the case of utilities failure, Jack Ellison, Public Health Emergency Planner for GCHD said that portable restroom facilities get delivered and other relief organizations such as the National Guard or Red Cross provide drinkable water.

The actual layout for the dispensing part of the POD generally stays the same regardless of the need, but the registration and security needs may differ depending on the reason for

POD deployment. In the case of a bioterrorism attack, a POD poses as a possible secondary target and therefore needs more security: separation of the assembly point and the POD may become necessary (Lee, Maheshwary, Mason, & Glisson, 2006). Natural disasters and natural outbreaks usually necessitate only one location. This cuts down on time for the public utilizing this opportunity and manpower needed. The research done on time and manpower needed for these different set-ups used a computerized Decision Support System (DSS) called RealOpt, described in Lee and Maheshwary's paper. According to their calculations, the combined model uses 65% to 76% of the assigned staff needed for the separated model.

#### POD Function

According to Mr. Ellison, "the main goal at a POD is to get them through as fast as possible." Even if the processing and dispensing process takes a long time, as long as lines still move, those in line feel like they progress and remain hopeful. In a training exercise conducted by Public Health of Seattle and King County (PHSKC), they accomplished continuity of flow by having participants stop to fill out their paperwork before entering the dispensing and processing part of the POD (Stergachis & Wetmore, 2007). This allowed individuals with difficulties reading or processing the requests on the forms to take their time without causing a bottleneck in the triage or dispensing process. The setup of PODs differ, depending on the source accessed. The PHSKC drill consisted of four stations: (1) filing out the form, (2) showing the form, (3) picking up the medication, and (4) turning in the form. This seemed to cause shorter total throughput times but the data comes from a drill scenario; in a real situation, the confusion and/or panic may cancel the expedience of the process. Generally, the need for triage, admission or processing, lines with line control stations, medication dispensing and final processing with education helps ease stress and anxiety. Some situations may call for additional assistance through security, psychological evaluation/ assistance, medical assistance, and question stations. Those only picking up medication for adults and do not need any special assistance due to drug interactions, special medical needs, or different dose calculations for pediatric dosages allow for an express dispensing option, a common trend in POD planning. According to Lee et al., eight primary activities exist in the dispensing process: (1) Assembly/ Intake, (2) Triage, (3) Orientation, (4) Registration, (5) Screening, (6) Service, (7) Education, and (8) Discharge.

### Assembly/ Intake

Public service announcements on radio or other media outlets invite the public to assemble at predetermined point(s) across the area. These announcements notify the public that only the head of household needs to come to the POD. According to the Philadelphia Department of Public Health (PDPH) Medical Center (POD) Operations Manual, the Head of Household Model means that “the Head of Household can obtain medication for all household members, so children, elderly, and special populations do not all have to come to the Medication Center (POD)” (pg. 1). In the case of a single point-source disaster such as a release of anthrax in a shopping mall, those affected assemble at a certain point. In contrast, in a wide-spread disaster such as a natural disaster, the government will establish multiple assembly points throughout the region. In the case of a bioterrorism attack, the actual PODs and medication would need protection meaning separation of the assembly point and the dispensing area. According to Lee, et al., “a tight security check would be performed by law enforcement or military personal at a separate site (the Assembly Point) and all cleared clients would then be

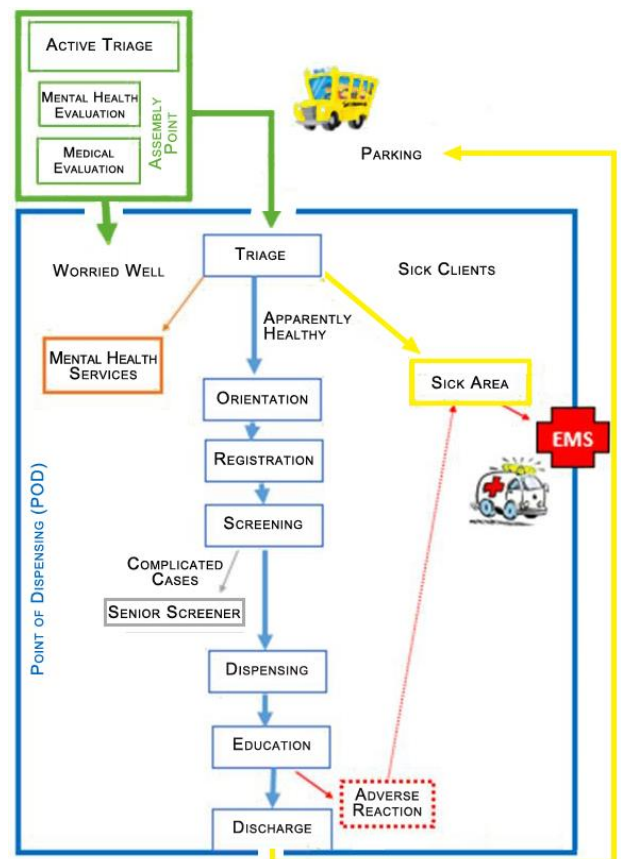


Figure 10: POD set up and flow original artwork by Iris Smithey and Richard Wayne Pierce

bused to the POD” (pg. 38). Mr. Ellison expressed concern because this method, with volunteers on the busses to answer questions during the drive, would put volunteers in harm’s way in confined spaces.

A remote assembly point has three main blocks: active triage, medical evaluation, and mental health evaluation. Since remote assembly implies a need for additional security, all of these blocks follow the initial security check-in. The active triage station staff engages clients and asks if they have any questions. A very small percent of clients get directed to the medical evaluation or mental health evaluation at the assembly point. At this point, medical evaluation



services those needing medical assistance for acute illness on-site or other emergent medical needs. Mental health evaluation aids those clients showing obvious signs of heightened anxiety to the point where they may interrupt flow and become dangerous to themselves or others.

Lee, et al. anticipated that 95% would continue onto the busses to progress to the POD.

At the assembly point, clients receive medical history forms to fill out during processing. Completion of forms may occur while waiting in lines or during the bussing process, depending on the situation. Intake greeters help guide clients toward the right path and progressively check the medical forms for legibility, correctness and completeness.

### *Triage*

Medical professionals such as nurses, emergency medical services personnel, physicians, physicians' assistants, and mental health counselors staff the triage station. The PODs could potentially become a hot-spot for disease incubation due to the major throughput for public processing; those at triage stations must practice diligence to recognize early symptoms. Even with a triage station, all volunteers and assistants throughout the POD should observe patients meticulously as they process them.

### **Epidemiologists Wanted**

The reason for epidemiologists in disaster preparedness may not be as apparent as, say an evacuation plan and medication stockpiles, but they do play a key role in planning and keeping the community safe during an event. "Hiring epidemiologists and statisticians ... improved disease surveillance" for the Florida Department of Health (Katz, Staiti, & McKenzie, 2006) because it allowed them to integrate surveillance systems and have a centralized database. During a disaster, their skills may be important to track disease trends and outbreaks or possibly to simply be on-hand to answer questions about diseases because they will have more knowledge of the disease situation than most first-responders.

The triage staff process all incoming clients into three groups: sick, the worried well, and apparently healthy. Medical personnel assess sick clients' condition in a sick area to determine if they need to transport him/her to a medical facility. In the case of a contagious disease, staff sort patients into those showing symptoms, those exposed but not yet symptomatic, and those with no known exposure. In this case, those showing symptoms fall into the category of "sick" and therefore ineligible for vaccination while the other two remain eligible for vaccination. Notification goes out to an epidemiology liaison if medical staff suspect a case of the disease of interest. The distressed clients, overwhelmed by the situation, experiencing a high degree of anxiety, receive assistance from mental health services. This maintains flow in the POD and makes sure that such individuals do not cause an overall air of panic. As expected, "major

disasters are typically major sources of trauma” (Melton & Sianko, 2010, p. 538). The next group of clients—those with no obvious symptoms—continue to the next step in the process.

#### *Admission/ Orientation*

POD plans mainly differ at this point. Many have the next station as an admission table where the head-of-household receives paperwork (attached to a clipboard) to fill this out for all individuals in their care. Others have an orientation area where clients stop in small groups to receive a short briefing on the situation and organization within the POD.

#### *Admission*

In the admission model, workers can answer basic questions about filling out papers. Certain regions may require bilingual individuals as well as signs directing line flow and station labels in multiple languages. One of the studies cited in the Lee article stated that “the use of multi-language signs proved to be very helpful, overcoming the overwhelming delays and chaos due to language problems” (pg. 43).

Set-up as a long set of tables parallel to line-flow, volunteers direct individuals to the next open station to pick up their forms. Clients then move to the next open queue to wait for dispensing. If running a disjoint model, placing admission/ forms dispensing at the separate assembly point allows clients more time to look over the paperwork. While waiting in line for dispensing, the client will fill out the paperwork assisted by the knowledgeable line control staff.

A key position, line control may seem like a simple and dispensable position. These individuals keep the line moving, identify bottle-necks in flow, and answer questions about forms while individuals move through lines. GCHD allows for an express line for those with physical ailments that make it difficult for them to stand in line for extended periods of time.

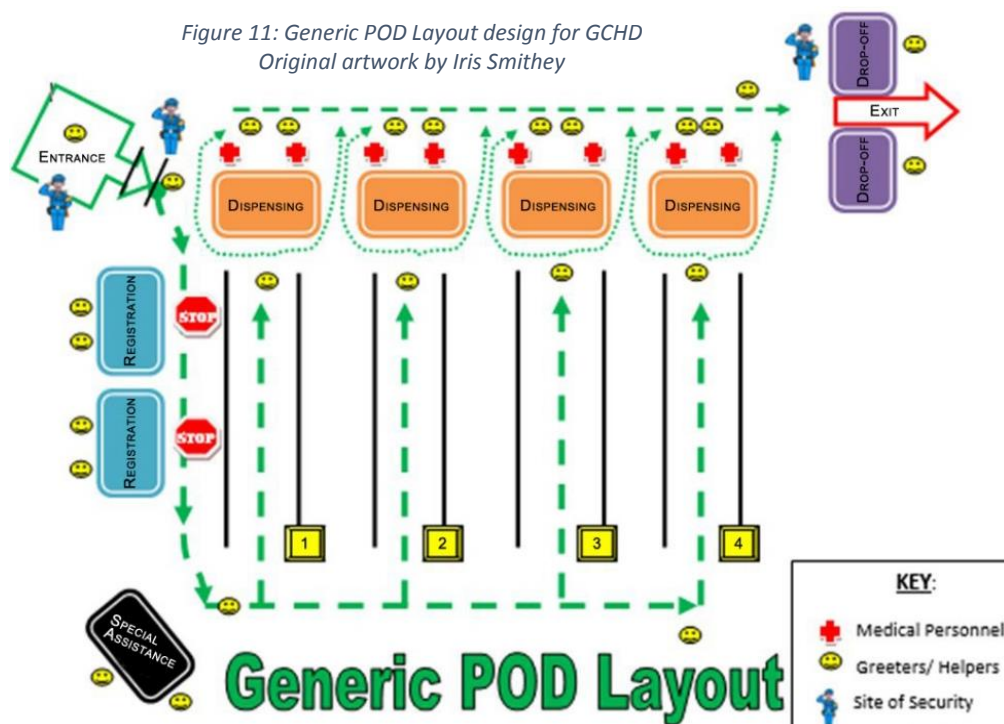
#### *Orientation*

In the orientation model, all clients stop in the flow for a brief orientation where “general information will be presented regarding the situation, prophylaxis and/or treatment, common adverse effects, and instructions for completing the regimen” (pg. 29). The orientation staff also presents hand-outs with information reinforcing the orientation presentation. These sessions possibly include educational videos and presentations to groups of 25-30, depending

on the flow and processing time of the POD. Running concurrent sessions helps expedite the process as well.

### *Tandem*

Not mutually exclusive, these two ideas of how clients could begin their POD experience may also run in tandem. Clients would receive paperwork at the admission table and then progress to orientation groups. The groups gather and then receive information before moving on to the next step. Orientation can also function as a stop-gate to control the line-flow to registration making sure progress through the POD does not get overwhelmed. This feeds into the illusion that line flow has not stopped as long as orientation representatives remain available for questions. The orientation presenter can tailor his or her program to fit the needs of the line flow. GCHD integrates their orientation



into the line flow by posting large signs along line progression. According to Mr. Ellison, this works similar to orientation because it includes televisions with videos on continuous loops.

### *Registration*

At the registration table, clients sign a numbered log sheet allowing staff to count total throughput. At this time, patients also sign a consent form and complete any remaining forms. Staff check forms for completeness and legibility then direct clients to keep the forms in their possession and present them at all remaining stations.

### *Screening*

Screeners complete a more thorough review of forms, looking for any possible problems; senior screeners help those with contraindications or more complex health histories.

Screeners interview clients and discuss services appropriate for each individual client and reinforce the fact sheet with frequently asked questions. z

### *Dispensing Service Area*

According to the PDPH POD manual, “each POD should have one pharmacist (Medication Dispensing Supervisor) to oversee dispensing activities” (pg. 13). If using express medication dispensing, this line speeds along individuals receiving only adult dosages of the medication. All others go to the medication dispensing area where, depending on the processing within the POD, staff may sort clients by their needs. An exercise run by Seattle and King County in Washington State used color-coded dispensing lines. “There were three color-coded dispensing lines: green (express adult standard dosage), blue (for anyone who needed to pick up pediatric suspensions), and orange (for anyone who needed dosage adjustments due to contraindications or other medical conditions or additional counseling with a pharmacist and for patients with disabilities or special communication or interpreting needs)” (Stergachis & Wetmore, 2007, p. 287). Staff work in pairs when vaccinating. A vaccinator checks the form, determines which vaccine and dose to administer, signs the screening form, and administers the vaccine while an assistant to draws up the vaccine, completes needed paperwork, and directs the client to contact their personal medical provider for additional information (Philadelphia Department of Public Health, 2008). When dispensing pills as medication, the teams stay together, one as a pill counter and the other working as the face to talk with clients and dispense medications. After receiving vaccination or medication, the clients continue to the education area.

### *Education Area*

The education area’s purpose covers two goals: to help reinforce messages the clients previously received and to observe patients for possible side-effects. While delivering last-minute reinforcement information and answering questions, educators watch for potential adverse reactions. In the case of a reaction, staff quickly move the patient to the sick area, and stabilizes them if needed. If indicated, the patient gets transported to an appropriate medical care facility. Reviewing the Frequently Asked Questions handout and the drug Fact Sheet accomplishes the educational goal of this station. The Seattle and King County Public Health

(PHSKC) agency also distributed “wallet cards, which contained contact information for PHSKC, Washington State department of health, and CDC hotlines and websites (pg. 287).”

#### *Discharge Area*

The discharge area is a final forms collection area where the staff reviews forms for completion and legibility and collects all forms for retrieval by logistics runners. These eventually enter a data entry program for analysis. The clipboards collected at this point remain in circulation via runners.

#### *Volunteer Force*

This process requires a lot of man-power to run smoothly. While public health professionals play key roles in these situations, they cannot fill all stations. Most areas can recruit health department employees to the cause, but this still only fills a small percent of the positions needed for the POD. The majority of positions need volunteers to fill necessary staff positions. Only a few positions require medical licenses, the majority of positions simply require an individual with a willing spirit. Jobs like greeter, line control, or data entry do not require much physical exertion and therefore individuals not in prime physical condition could fill these positions. At GCHD, they figured that each POD would need 42 individuals per shift which makes for a total of over one-thousand individuals among their 12 POD sites. The staff of volunteers and professionals alternate on 12 hour shifts until they dispense all medication—hopefully meeting the goal to have this completed in 48 hours.

While at GCHD, I participated in their volunteer recruitment drive. This included attending many educational community organization meetings, including presentations about the health district and the opportunities for health care offered. To recruit volunteers for the Galveston County Medical Reserve Corps (MRC), we educated them about the MRC and what we do for the community. The volunteer recruitment coordinator was only responsible for making contact with organizations such as Lion’s Clubs, Kiwanis Clubs and Police Academies to set up opportunities for us to make presentations. We also presented to larger businesses to recruit some of their employees and targeted medical personnel through meetings at local hospitals. In my 6 weeks with the health district, the volunteer force grew from 180 to 1680.

### *Training and Retention*

We also began building a volunteer training and retention program with the goal to get ready to respond to a disaster. As previously stated, most positions do not require specialized training, but a familiarity with specifics of communication during a disaster and knowledge of the flow of command helps.

In the feedback questionnaire from the training conducted during my internship, the volunteers requested more trainings and involvement opportunities (summary of results from the feedback questionnaire attached in Appendix E). Those involved in MRCs have many different training prospects. MRCs should provide some and consider them necessary for all members, while some trainings target those with more drive. Volunteers should also consider different trainings and opportunities offered through other community organizations.

The first MRC orientation welcomes new members, gets everyone oriented, and makes sure all volunteers have a handbook and official name badge. Available online, sample handbooks with name badge designs provide outlines to make sure one's handbook covers all essential topics. The orientation also offers an opportunity to answer any questions volunteers may have. The training should also introduce the Incident Command System (ICS). The minimum courses for all volunteers include IS 100 and IS 700. Other trainings that all members should attend include a First Aid and CPR course and a Psychological First Aid course. Volunteers can take the courses individually the MRC could set up to have them presented to the group to promote teamwork and a feeling of community. The MRC could also provide online courses in the diseases that they may respond to as well as an introduction to epidemiology and what goes into disease tracking and management. Additionally, for a POD Manager Certification, individuals should attend additional courses such as FEMA's SNS introduction and the more advanced ICS training courses. In the study conducted by Lutz and Lindell when reviewing use of the Incident Command System (ICS) during Hurricane Rita, they concluded that "ICS implementation in TEXAS EOCs [Emergency Operation Centers] during Hurricane Rita left much to be desired (pg. 132)." Further, the study suggests that "ICS, as currently designed and trained, does not generalize well to all types of organizations responding to all types of hazards (Lutz & Lindell, 2008, p. 132)." The authors go further and state that the problem lies in the ICS training platform. One respondent to the Hurricane Rita

survey stated that “I am not familiar with ICS in a practical sense. I have been involved in training but they are very dry (pg. 135).” This participant speaks to an MRC’s need to engage their participants.

While book knowledge and lessons help, planned preparedness exercises provide invaluable hands-on experience. According to Katz and Staiti, these “test such capabilities as emergency communication systems, vaccine distribution, and command-and-control structures (pg. 950).” With the current popularity of shows such as “The Walking Dead” and movie series like “Resident Evil,” the professionals at GCHD joked about using a zombie attack as a mock-deployment exercise, using candies for the “pills” and to even go all the way through a complete volunteer call-down and POD deployment. Such an exercise allows everyone to practice what they learned in courses such as IS 100 and also allows the professionals to see where they still have gaps in the training regimen. “Drills and exercises with the many players that make up a municipality’s first-response teams, as well as citizens and nongovernmental organizations, are critical to assess the extent of a locality’s reliable, functioning capabilities to identify gaps, and to take concrete steps to fill those gaps (Irwin Redlener, 2006, p. 102).”

### Incident Command System (ICS)

Disaster response always requires multiple emergency response agencies to work together. However, first responders do not always communicate on the same wavelength. Unfortunately, the disaster in New York on September 11, 2001 showcased this weakness. “Police officers on the ground could not communicate with the firefighters who were in the higher floors of the World Trade Center in order to warn them to evacuate the buildings. ... The loss of 343 firefighters on Sept 11 [was] due to the simple fact that police and firefighters did not have interoperable communications devices” (Bersch, 2010). Two keys to solving this problem include the Incident Command System and the Emergency Operations Center.

The Incident Command System initially began in response to deficient communication, coordination and management in responding to California wildfires in 1970 (Davies, Deric, & Davies, 2005). By 1982, the National Interagency Incident Management System adopted the system for use by police and other fire/rescue systems. More recently, “flaws in the response to the World Trade Center terrorist attacks led to the development of the National Incident Management System ICS (NIMS ICS), which must be adopted by any state or local jurisdiction



receiving financial support from the federal government” (Lutz & Lindell, 2008, p. 123). NIMS provides a proactive approach for organizations to work together to “prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life and property and harm to the environment” (FEMA, 2012, p. 2).

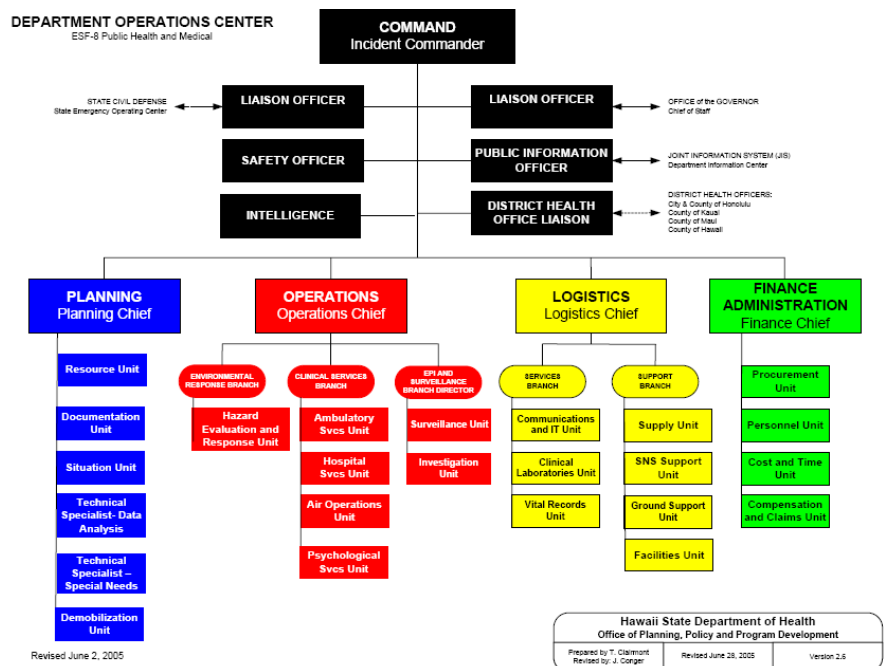


Figure 12: Large Agency ICS Example, from Hawaii Department of Public Health (Claimont, 2005)

The ICS provides a framework for crisis response that centralizes authority to an incident commander to direct the emergency and all the organizations taking part in the response. Management systems are organized in four main areas: planning, operations, logistics, and administration/ finance. ICS became so wide-spread that schools adopted the program so that emergency response personnel and school personnel can talk using a common language in a time of need (Barnes, 2011, p. 18). All staff members respond to only one supervisor and that supervisor only watches over a few individuals. The ICS 100 training notes recommend a ratio of one supervisor to five subordinates; this keeps the chain of command manageable and orderly.

#### Unified Command: the Incident Commander

ICS unifies command in a disaster or other situation. This means that all the different organizations and departments responding to a disaster would all fall under one incident command system and structure; one incident commander (IC) takes charge of the entire event response. Instead of the policemen acting as one unit, the firefighters as a different entity, and the EMS or other health care professionals as yet another, one umbrella encompasses them all. “A unified command is expected to foster the development of a single and common set of goals

and strategies, facilitate coordination and the flow of information, clarify responsibilities and restrictions for each actor, and optimize network effectiveness (Moynihan, 2008, p. 207)."

While the police department still works independently from the fire department, these two response efforts work within the ICS to coordinate the effort and make sure duplication of tasks does not occur. The two highly specialized groups, utilized for their knowledge and skills, work within one of the four components of ICS: operations, logistics, planning, or finance and administration. Within the unified command system, every incident should have an Incident Action Plan (IAP) which gives specific objectives, activities, and operational time frame. In most emergency situations, the Incident Commander, stationed at the Incident Command Post (ICP), can oversee all incident operations. The city's Emergency Operations Center (EOC) houses the ICP in most situations.

#### Emergency Operations Center (EOC)

A central command facility, the EOC carries out emergency preparedness and emergency or disaster management functions at a strategic level. Most communications within the ICS go through this secure location in a disaster. During my internship, I observed a hurricane response training including activation of the county's EOC. The EOC became the headquarters for liaisons from the different organizations responsible for coordinating a response during a hurricane: the health district, EMS, police and fire departments, road and bridge maintenance, the Coast Guard, as well as many other city and county groups that I did not recognize. All activities coordinated through a program called WebEOC where each group watched the real-time action reports from the field as the participants provided input. Participants entered either reports from the field that needed action or members at the EOC could enter actions taken to fix situations in the field. Many of the key-players in a disaster response also have this program on their telephones to enable them to use it while in the field. Traffic cameras gave live feeds into the room on multiple monitors to keep track of evacuation efforts and any other issues. According to Mr. Ellison, the EOC receives requests from the field for supplies they use up. He mentioned that a lot of cross-talk between the different organizations helps each other out. He said that for hurricane Ike, they all arrived to their stations before the storm hit. For the most part, participants just rode-out the storm and monitored the aftermath until about four to five days after the storm made land-fall. Then they

dealt with calls for more supplies and assistance needed, especially as the public returned to their homes. While tools like ICS and equipment in POD boxes are invaluable in a disaster, they are useless without the proper prior planning in place.

## CHAPTER 3: Field Experience

I started my field experience on May 20<sup>th</sup>, 2013 with the following objectives:

- Apply lessons from course work in epidemiology and other courses to gain real-world experience in the health field.
- Work with professionals in the field and recruiting volunteers, and learn how to recruit, educate and lead volunteers in a public health emergency.
- Learn procedures involved in disaster preparedness.
- Attend and partially coordinate a 3-day exercise and hurricane preparedness training with POD activation.
- Develop and write an orientation and training program for public health volunteers developing a public health disaster relief program involving POD deployment.

### Storm Preparedness Drill

The 3-day Storm Preparedness Drill, began on May 29<sup>th</sup>, involving Hurricane Gaviota making landfall in San Luis Pass. The imaginary storm struck as a major hurricane, causing evacuation of Galveston County. The first day was spent at the county Emergency Operations Center in Dickinson, Texas. Over 100 participants made decisions and took actions based on unfolding situations and roles (Police News, 2013). The exercise controllers communicated dozens of



Figure 13: Galveston County Emergency Management Facility  
*Invalid source specified.*

scenarios and requests to the players to test their handling of adverse situations. In an interview with a local television station, one of the experts likened this drill to a football team practicing: you would not want them to take the field without prior practice and that's just what the professionals were doing at this time.

I sat-in as a volunteer with a representative from the Galveston County Health District: Jack Ellison, the Public Health Emergency Planner. Inside, the facility houses a large control room where row after row of computers are set up on tables along with phones at the different stations for each represented organization. At each station, individuals monitored the situation via a computer program called WebEOC where different first responders either input updates about the situation as they came in: "There is a group of residents hunkering down in Fort Travis refusing to evacuate." As these updates came up on the screen, the responders then took the appropriate action from the command post to deal with situations as they unfold: "The Sheriff's department is sending over a deputy to disperse the crowd." Other organizations can also post their input or assistance: "The parks department is sending two busses to assist in transporting the group to shelters." Those in the field can also keep in touch with the EOC to update the situation via mobile WebEOC on their phones: "The deputy arrived and reported that there is some kind of disease outbreak and many of the group are ill with an indeterminable illness." Appropriate response can then be taken from the command center: "EMS is dispatching 2 ambulances to assess the situation."

Many organizations participated in this exercise and in the late morning, a conference call gave everyone an update on the weather conditions and general evacuation status of the area. It was interesting to see how an evacuation is run from the inside because they start from the most southern point and evacuate cities and counties slowly progressing northward. I originally thought this was solely because the storm moves from south to north and they wanted to get the people out of the most danger the fastest but that's not the only incentive: they emphasized the point that they wanted to make sure everyone evacuated the southern counties and gave them ample time before evacuating Houston because once Houston is given the mandatory evacuation order the northbound roadways become completely grid-locked, trapping anyone south of that area. In talking with someone who went through hurricane evacuations, she said that she still has panic attacks when stopped in traffic because she feels like she is trapped just as she was during the hurricanes: at that time, she was trapped in traffic and could not go anywhere, just sitting and waiting for the storm to arrive.

As the Public Health and Galveston County Health District representative, our part was to watch for any messages along the lines of “we have run out of ‘X’ medication and need assistance.” We would then run the message up the appropriate lines to request assistance from the Strategic National Stockpile. If mass public medication dispensing were necessary, we would also set up a Point of Dispensing to accomplish such a task. As part of this drill, we set up a Point of Dispensing (POD) on the second day and involved volunteers from the local Medical Reserve Corps as part of the training.

### Point of Dispensing Deployment Training

The second day, GCHD prepared for and led a POD deployment training at a local college. In preparation for this meeting, I spent many hours researching the background and general set-up for PODs, including constructing a general POD map to fit with my mentor’s vision of POD function and flow and then adapting this map to fit the college’s gymnasium. These images both became part of the participant information packet that all volunteers

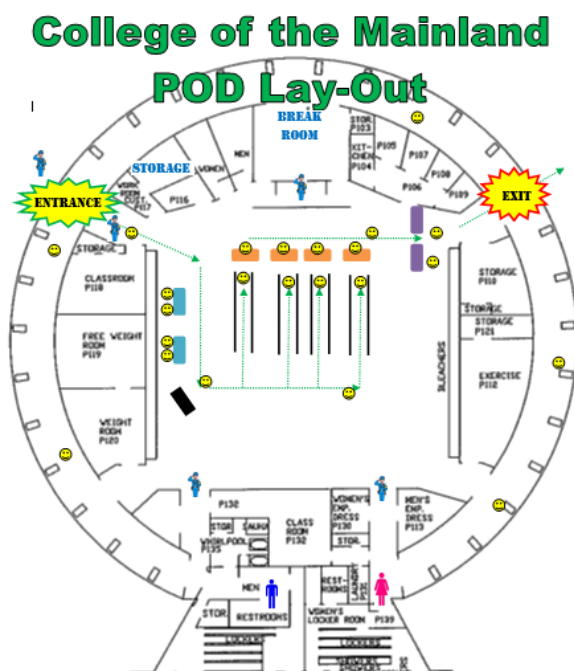


Figure 14: Site-specific map for POD deployment, larger image can be found in Appendix D

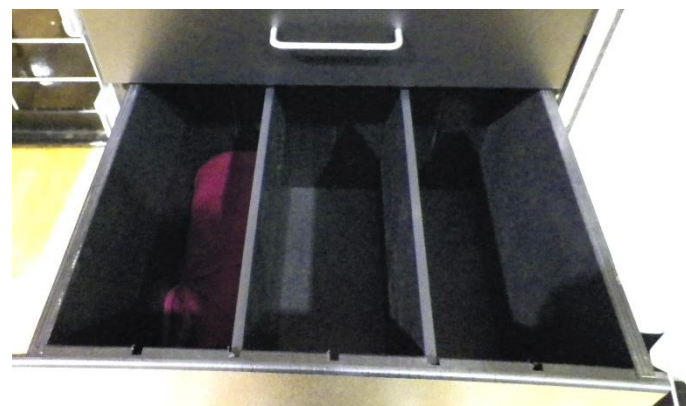
received. Other items that I put together into these packets included: outline of activities, general notes, job descriptions for a mass vaccination clinic, a sample patient history form, and a participant feedback survey. I also constructed an agenda for the professionals leading the training, including target times for each event and brief notes with speaking points to insure certain ideas got covered (attached in Appendix F). In the hours before the training, I printed and assembled the packets, went to the warehouse and assembled backpacks of goodies

for the volunteers, and tried to coordinate the professionals on how the presentation would run. Packing the backpacks meant climbing up and down ladders and shelves, digging through boxes, and making sure all three-dozen bags had consistent contents: portfolio with notepad, hand sanitizer, ink pen, handbooks covering ICS and other aspects of disaster preparedness, chip clip, and a stainless steel water bottle.

Everything we needed, including stanchions, 3 of the 4 necessary POD boxes, a pop-up canopy, a few fold-out tables, chairs, food, ice and a few other details got packed into the emergency response trailer, pulled behind the disaster response Excursion and we all loaded up and were on our way by about 4:00 in the afternoon. Once we arrived, we setup our check-in station outside (complete with the sign-in sheet I made) and set up the POD in the gymnasium.

In an exercise such as this, an agenda is key for the ease of keeping the meeting or training progressing in a logical fashion to keep the meeting on schedule, to keep the information flowing progression, and to make the information, especially that provided in handouts, easier for participants to follow. Following an agenda and notes also makes sure that key information is not overlooked and all important personnel are introduced. Finally, the participant packet should include a feedback survey to collect constructive criticism and ideas for building better future training programs.

The third day of the training was reserved for staff to complete after-action reports and discuss the exercise and any problems that arose during the process. I compiled the results of our feedback surveys (results in Appendix F) and met with the professionals to discuss our training. Overall, the feedback was positive with a few pieces of constructive criticism. The final point I brought up from the trainings was about the POD boxes: I noted that these were in no way ready to be deployed in the case of a mass vaccination clinic or in the case of other needs. The three boxes we had at the training were a jumbled mess of office supplies, medical supplies, and every other type of supply you could want, but randomly stuffed into drawers. The disorganization was difficult to work with and I suggested that the boxes be made deployment ready. In talking with the county professionals, I suggested that instead of re-writing trainings that were already available, my time would be better spent preparing their supplies and making the POD boxes deployment ready. POD Box Organization



*Figure 15: POD boxes before, with empty drawers and mixed contents*

After assessing only a few boxes at the training, I knew that they were not conveniently accessible: many had at least one empty drawer, office supplies sat stuffed in with medical supplies and electrical extension cords were thrown in where ever they would fit. Once I started looking into the boxes, I realized this was a much larger undertaking than I originally planned: each of the 12 sites required 4 boxes (trunk, refrigerator box, 3-drawer box, and storage box), plus there were a few additional boxes used for educational outings to hold promotional items or educational items. On top of all that, I had to find all the equipment needed for all 48 standard POD boxes in the warehouse, with shelves stacked to the two-story ceiling in addition to the loft area, stocked with stanchions, coolers, pop-up tents and much other necessary equipment. The first part of this process involved compiling inventory lists from GCHD and other organizations for what should be included in a full POD deployment set. This information was then processed into one coherent list after consulting with Jack Ellison. He and I then spent an entire day working to get all that equipment into the 4 box set, trying to keep to a plan of using the trunk for office supplies, the refrigerator box and three-drawer box for medical supplies and the large open box for larger supplies like bull horns and back-stock of other supplies such as gloves and cotton balls. Once one full set was completed, I wrote an inventory list of all the boxes, all the drawers, and labeled the drawers to make sure supplies can be found easily and quickly when needed. I then made 48 copies of the inventory list and





laminated these, to include one in each box once completed. This list was used in packing the remainder of the boxes.



*Figure 16: Organized and labeled POD boxes (3/4 of full set)*





Figure 17: POD supplies warehouse

Jack Ellison and I spent the next few weeks in the warehouse, in the Texas summer heat pulling out the POD boxes, focusing our efforts on one type of box at a time (e.g.: the refrigerator boxes all got packed first). Other staff members helped when their schedules allowed, but it was mostly an undertaking by Jack and myself. Once we started pulling out the boxes from the warehouse, we found these to be even more of a mess than I originally thought: all 12 of the three-drawer boxes were stocked with medical, office, and general supplies including extension cords, pens,

individual hand sanitizer and a random collection of other materials, depending on which box was opened. Many of the large open POD boxes were either completely empty or contained all of one type of resource, like finding all 15 bullhorns in one box, a knot of extension cords in another, and a large collection of flashlights still in their packaging in yet another. Finally and probably most frustrating was the amount of supplies still stocked on the shelves that needed finding, digging, and distribution



Figure 18: Outdoor workstation



Figure 19: One full set of boxes, packed and ready for deployment

into the boxes including sharps disposal containers, collapsible coolers, printers, and many other valuable resources. Not only were these resources not being put to good use, but they were an expensive asset just sitting on shelves, not even ready to be used. This project was almost completed when I reached my deadline to

finish my time with GCHD, and I left Jack with the instructions and last few inventory lists to finish the trunks of office supplies that needed finished and then the dozen sets of four POD boxes would be complete. I checked in at a later date and all these are packed and ready for deployment when needed! (Editorial note: more information on POD boxes and organization can be found in the next chapter.)

### Field Experience Summary

I started my field experience with the Galveston County Health District on May 20<sup>th</sup> with the objectives to gain experience in public health, focusing in disaster preparedness and epidemiology and with the goal to build a volunteer training program for their Medical Reserve Corps to prepare volunteers for disaster response. Once I worked with the professionals in planning, participating in, and executing the three day training in late May that included a POD deployment, I found out that they had a much bigger need for their PODs to be ready for deployment than to have a training program put together. This change in goals came mainly from discussions with Jack Ellison, who actually showed me many different training exercises that were already in place at the health district, including power-points and online portions. This was then presented to my in-house mentor on the disaster-preparedness side who agreed that my time could be better spent organizing the boxes and making them deployment-ready. I then shifted focus to organizing the POD boxes and made them much more functional and ready for use in case of a disaster or other need for mass-medication.

### Hope on the Horizon

With perseverance through multiple hurricanes and the ingenuity to hatch original solutions like the seawall and raising the city, Galveston has shown amazing resilience. Plans like the PODs and preparedness tools like the EOC speak to Galvestonians' ability to get ready for whatever may come their way. A program like the proposed threat-level and preparedness-level assessment would allow the Galveston government and emergency preparedness professionals to ensure that they are addressing all the needs in the area. Additionally, this program confronts the discrepancy between funds available and monies needed for preparedness efforts. In Katz's article, one public health official described "a disproportionate amount of money being allocated to the 'virtual disease' of bioterrorism rather than real

disease such as TB (pg. 955).” This points out the need for funding availability for where ever it is deemed necessary. Having a threat-level and preparedness-level assessment program allows professionals to say, statistically, where discrepancies lie. If the threat-level is higher than the preparedness-level, then the region needs to focus more on being prepared for their local threats. The assessments allows them to fine-point to where this attention is needed, be it in preparing PODs for hurricane response or strengthening the local dam. On the other hand, if the preparedness-level is higher than the threat-level, then when the local health department receives funding labeled for “terrorism preparedness” from the Department for Homeland Security, it can focus this funding more into epidemiology and other measures for disease control and prevention rather than purchasing POD boxes or another portable disaster response vehicle. Finally, public-awareness campaigns and information like that found in Appendix G help individuals better prepare themselves and their families for disasters and no disaster preparedness professional can focus on their work until they know their family is safe.

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## Appendix A: List of Abbreviations

BRI	Biosecurity Research Institute
BSL (1-4)	Biosafety Level (1-4)
CDC	Centers for Disease Control and Prevention
DFWS	Dam Failure Warning System
DHS	Department of Homeland Security
DSS	Decision Support System
EMS	Emergency Medical Services
EOC	Emergency Operations Center
FEMA	Federal Emergency Management Agency
GCHD	Galveston County Health District
IAP	Incident Action Plan
IC	Incident Commander
ICP	Incident Command Post
ICS	Incident Command System
KSU	Kansas State University
MI	Managed Inventory
MRC	Medical Reserve Corps
NBAF	National Bio and Agro-defense Facility
NIMS	National Incident Management System
PDPH	Philadelphia Department of Public Health
PHSKC	Public Health of Seattle and King County
PIO	Public Information Officer
POD	Point of Dispensing
RealOpt	Resource Allocation Optimization
SNS	Strategic National Stockpile
UTMB	University of Texas Medical Branch

## Appendix B: Richter Scale

Rating	Explanation	Explanation	Frequency
>2.0	Micro	Micro earthquakes, not felt	continual
2.0-2.9	Minor	Generally not felt, but recorded	1,300,000/year*
3.0-3.9		Often felt, but rarely causes damage	130,000/year*
4.0-4.9	Light	Noticeable shaking of indoor items, rattling noises—significant damage unlikely	13,000/year*
5.0-5.9	Moderate	Can cause major damage to poorly constructed buildings over small regions. At most slight damage to well-designed buildings.	1,319/year
6.0-6.9	Strong	Can be destructive in areas up to 99 miles across in populated areas	134/year
7.0-7.9	Major	Can cause serious damage over large areas	15/year
8.0-8.9	Great	Can cause serious damage in areas several hundred kilometers across	1/year
9.0-9.9		Devastating in areas several thousand kilometers across	1/10 years*
10 +	Massive	Never recorded, widespread devastation across very large areas	Extremely rare

Table 4: Richter Scale (Cuadrilla, 2013)

\*estimated value

## Appendix C: POD Box Set Inventory

### Trunk

#### Drawer #1

- 4 staplers (pre-loaded)
- 4 boxes staples (500 count)
- 3 scissors
- 2 calculators (solar and battery powered)
- 1 date stamp
- 12 rolls invisible tape
- 8 boxes black pens (12 each)
- 1 box highlighters
- 5 boxes jumbo paper clips (100 count)
- 12 pads post-its
- 2 pads large post-its

#### Drawer #2

- 24 pads post-its
- 3 rolls masking tape
- 3 flashlights
- 1 package hanging name badges (50 count)

#### Drawer #3

- 4 clipboards

#### Drawer #4

- 2 surge protectors
- 2 extension cords (25 foot and 50 foot)

### Stacking US POD Box

- 4 packages of radios (2 each)
- 2 rolls of rope
- 2 rolling soft-sided coolers
- 1 case of clipboards (48 Masonite)
- POD signage
- 1 case of tissues (30 boxes/ case with 100 tissues/ box)
- 3 cases Nitrile gloves:
  - 1 Medium
  - 1 Large
  - 1 Extra-Large
- 1 case cotton balls (2 bags/ case with 2000 balls/bag)
- 3 traffic directing flashlight wands
- 3 cases N-95 respirators (6 boxes/ case with 20/box)
- 1 printer
- 2 rolls orange caution tape
- 4 rolls yellow caution tape
- 1 roll orange tape (not printed)
- 4 1-gallon jugs of hand sanitizer
- Bull horn
- Vests

### Refrigerator Box

#### In-lid storage

##### Nitrile Gloves:

- 1 box size small
- 1 box size medium
- 1 box size large
- 1 box size extra-large

##### Adhesive Bandages (Band-Aids)

(+/-) Bottles of individual hand sanitizer

#### Drawer #1

- 8 packages 3x3 gauze sponges (200 count)
- 2 boxes tissues
- 16 individual bottles hand sanitizer

#### Drawer #2

- 3 boxes N-95 type respirators (20 count)
- 3 boxes procedure masks (50 count)
- Extra Nitrile gloves:
  - 2 boxes size medium
  - 2 boxes size large
  - 2 boxes size XL

- 1 box tissues

##### Table drapes

#### Drawer #3

- Bag of cotton balls (2000)
- 2 Biosharps containers
- Handful of biohazard bags

Note: thermometer for the refrigerator is in the refrigerator in its box. There is also an extension cord specifically for the refrigerator stored tucked in next to the unit.

### Large US POD Box

#### In lid storage

##### Adhesive Bandages (Band-Aids)

#### Drawer #1

- 6 boxes tissues (100 2 ply)

##### Nitrile Gloves:

- 2 boxes size small (50 count)
- 2 boxes size medium (50 count)
- 2 boxes size large (100 count)
- 2 boxes size extra-large (100 count)

- 1 package (10) protective glasses

(+/-) 2 boxes thermometer probe covers (1000 each)

(+/-) 1 human oral thermometer

#### Drawer #2

- 8 packages 3x3 gauze sponges (200 count)

##### Nitrile Gloves:

- 9 boxes size small
- 8 boxes size medium
- 7 boxes size large
- 7 boxes size extra large

- 2 extension cords (25 foot and 50 foot)

##### Sterile towel/ drapes

#### Drawer #3

- 3 Biosharps containers
- 1 large bag cotton balls (2000 count)
- First-Aid kit



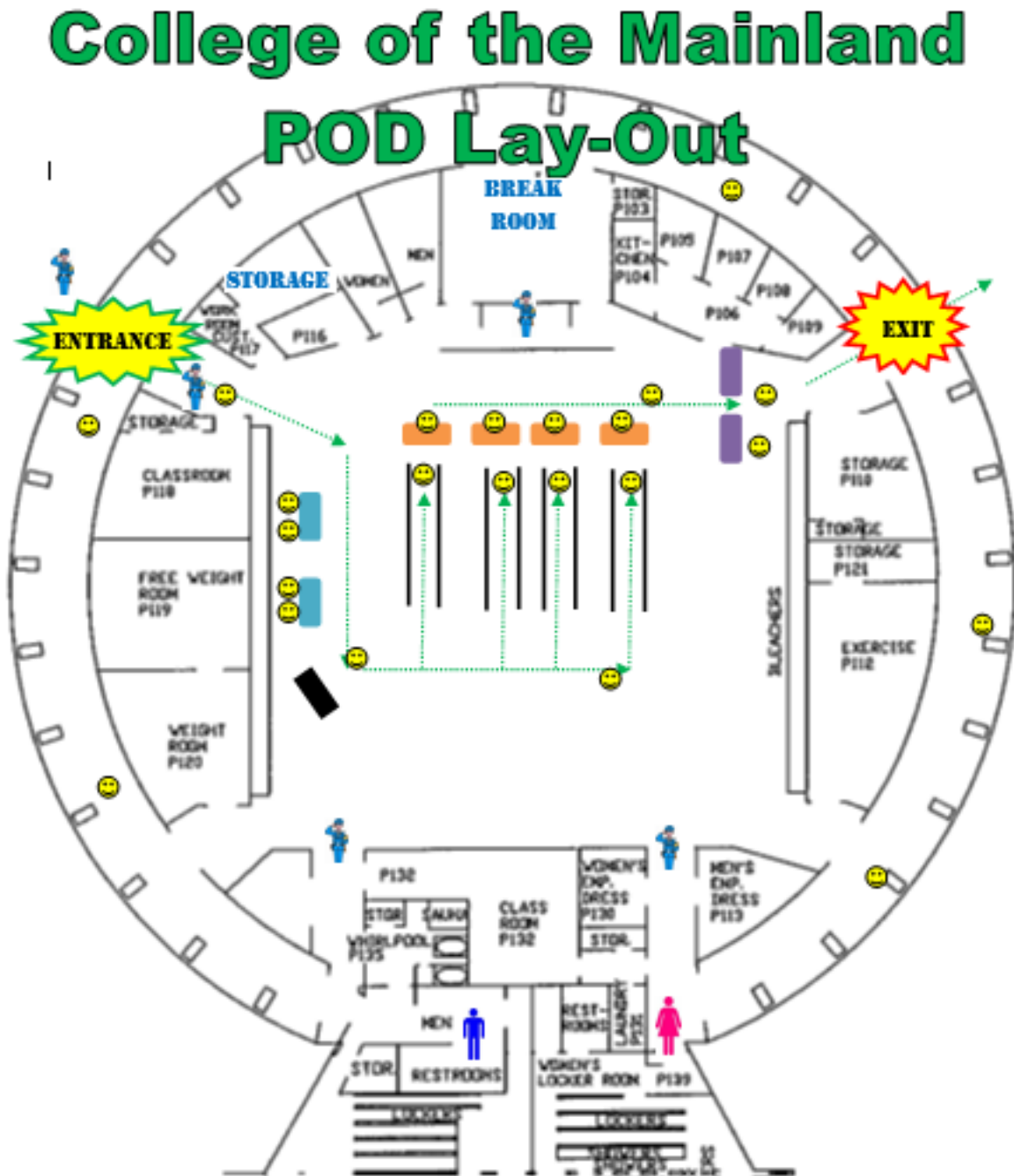


Figure 20: POD site-specific map for COM  
Original artwork by Iris Smithey



## Appendix E: Training Feedback Summary

# POD Training—Feedback Summary

Location: College of the Mainland Date: May 30, 2013

(1) highly not satisfied, (3) neutral/ no opinion or does not apply and (5) highly satisfied

**1. Overall effectiveness of the staff:** 6 “satisfied” and 12 “highly satisfied”

- Staff were very knowledgeable and engaging
- The walk through was excellent

**2. Overall preparedness of the staff:** 1 “neutral/ no opinion/ does not apply,” 4 “satisfied,” and “14” highly satisfied”

- Missing t-shirts!

**3. Ability of the staff to answer questions:** 4 “satisfied” and 15 “highly satisfied”

**4. Overall flow of the presentation/ training:** 5 “satisfied” and 12 “highly satisfied”

- Hard to hear because of gym activity

**5. Amount you feel you learned from the training:** 1 “neutral,” 6 “satisfied,” and 8 “highly satisfied”

- (no answer on the scale) → I've been through this a time or two
- Would like to do a walk through
- I know everything prior to exercise

**6. Overall impression of the training:** 6 “satisfied” and 11 “highly satisfied”

- very good introduction to the POD concept

**7. Would you feel comfortable responding to a disaster after this training?** 1 “no” 1 “maybe” and 16 “yes”

- it's doable but we need to do a real drill too
- I would feel comfortable with any position. I am able to give shots (diabetic brother)
- (circled both yes and no) → I feel prepared on how the POD works but still have would liked further info
- Maybe → I just need to experience the real deal

**What else could we/ should we do in future trainings to prepare volunteers?**

- walk through what is needed to educate and train self

- Perhaps a setup and a walkthrough drill
- Send out a typical scenario
- Would like a couple of drills
- We need a place to meet that has no interference
- Categorize volunteers as to what area they are qualified/ comfortable in serving
- Maybe allow volunteers to practice setting up a real POD

**What other trainings would you like to see offered in the future?**

- SNS
- The other trainings listed in the MRC handbook
- Maybe you can convince Popoff or Trish with COM to conduct the ICS class 100 for volunteers. Much better than computer class.
- Any emergency response in Galveston County
- Practice run through
- Mental health services
- Mock call-up to individual PODs

**Other notable notes:**

- Need to have better directions about parking/ directions on how to get there (including address) and parking instructions
- Now we need to have a list of what we do with the volunteers—we've caught them so what do we do with them now?
- Need to add unloading the trailer in to the training along with actual physical set up



## Appendix F: Point of Dispensing Training—Agenda

**5:00** fire up the grill!

Introductions: Name, title, why are you here? Where are you from?

Registration

Sign-up sheet including contact info (e-mail and phone—should have this printed on cardstock and then on a clipboard, possibly have 2 copies so the line does not bog down at just one

**5:15** eat 😊--Ballpark bun-length all beef hot dogs on buns with condiments in hot-dog boats

**5:45** clean up (need trashcan)—any other introductions?

**6:00** Welcome! (glad to have you, thank you, etc)

Introduce the idea of SNS—strategic national stockpile (refer to the notes sheet and the “Quick Books”)

This is then delivered to and utilized as PODs→ and this is where you come in!

**6:15** Hurricane hits (or there is a mass casualty event, or bioterrorism threat, whatever)→ mass panic ensues, what’s next?

**6:30** Walk the whole group through the POD set up in the gym—go over the map first and discuss the overall flow pointing out points of security/ police intervention and also where each section will be stationed

- Challenge the group to come up with problems to overcome/ problem-solve
- As we go through each station, this is the time to hand-out the just in time training sheets for each station and then review what will be required at each station—be sure to point out that they may be responsible for helping out at multiple stations during one shift so that they don’t get bored doing the same thing for a 12-hour shift

**7:15** (*ish*) Break-down and have them help us pack it all back up so that they can see how/ where it all goes

**7:45** Conclusion with summary, inspirational remarks, **questions**, and make sure everyone fills out their review form (how did we do? What else would you like to see?)



[illegible]

- 8000 casualties= the number of people hurt by a hurricane that struck Galveston, TX on 9/8/1900 (*editorial note: this caused Galveston to build the seawall to help prevent this kind of devastation in the future*)

- 95%= the % of roofs damaged during hurricane Andrew
  - 3.5 million= the # of homes without power during Sandy